WHAT IS CLAIMED IS:

1. A photoelectric conversion device comprising at least an electron acceptive charge transfer layer, an electron donative charge transfer layer, and a light absorption layer existing between the charge transfer layers, wherein either one of the charge transfer layers is a semiconductor acicular crystal layer comprising aggregate of acicular crystals.

2. The photoelectric conversion device according to claim 1, wherein the diameters of the acicular crystals are 1 μm or less.

3. The photoelectric conversion device according to claim 1, wherein an aspect ratio of the acicular crystal is 5 or more when the aspect ratio is defined as the ratio of the length to the diameter of the acicular crystal or as the ratio of the length of the acicular crystal to the length of a shortest line in a transverse cross-section passing the gravity center of the acicular crystal.

4. The photoelectric conversion device according to claim 1, wherein an aspect ratio of the acicular crystal is 10 or more when the aspect ratio is defined as the ratio of the length to the diameter of the acicular crystal or as the ratio of the length of the

acicular crystal to the length of a shortest line in a transverse cross-section passing the gravity center of the acicular crystal.

5. The photoelectric conversion device according to claim 1, wherein the semiconductor acicular crystal layer is provided on a substrate, one end of the acicular crystal forming the semiconductor acicular crystal layer is bonded to a principal plane of the substrate, and the angle formed between the axial direction of the acicular crystal and the principal plane of the substrate is 60° or more.

6. The photoelectric conversion device according to claim 1, wherein the semiconductor acicular crystal layer is provided on a substrate with an electrode, one end of the acicular crystal forming the semiconductor acicular crystal layer is bonded to the electrode, and the angle formed between the axial direction of the acicular crystal and the principal plane of the substrate is 60° or more.

7. The photoelectric conversion device according to claim 1, wherein the light absorption layer comprises dye.

8. The photoelectric conversion device according

to claim 1, wherein the acicular crystals comprise a metal oxide.

9. The photoelectric conversion device according to claim 8, wherein the acicular crystals comprise titanium oxide.

10. The photoelectric conversion device according to claim 8, wherein the acicular crystals comprise zinc oxide.

11. The photoelectric conversion device according to claim 8, wherein the acicular crystals comprise tin oxide.

12. The photoelectric conversion device according to claim 1, wherein a part of the acicular crystals exists in fine pores of a finely porous layer having a number of fine pores.

13. A method of producing a photoelectric conversion device which comprises at least an electron acceptive charge transfer layer, an electron donative charge transfer layer, and a light absorption layer existing between the charge transfer layers, the method comprising applying a solution containing acicular crystals on a substrate and firing the substrate to

form a semiconductor acicular crystal layer comprising aggregate of acicular crystal on the substrate and utilizing the semiconductor acicular crystal layer as either one of the charge transfer layers.

14. A method of producing a photoelectric conversion device which comprises at least an electron acceptive charge transfer layer, an electron donative charge transfer layer, and a light absorption layer existing between the charge transfer layers, the method comprising forming a semiconductor acicular crystal layer comprising aggregate of acicular crystals on a substrate by a CVD process and utilizing the semiconductor acicular crystal layer as either one of the charge transfer layers.

15. The method of producing a photoelectric conversion device according to claim 14, comprising the steps of providing an aluminium layer on a surface of the substrate, anodizing the aluminium layer to form a finely porous alumina layer, and growing the semiconductor acicular crystals through the alumina fine pores by a CVD process.

16. A method of producing a photoelectric conversion device which comprises at least an electron acceptive charge transfer layer, an electron donative

charge transfer layer, and a light absorption layer existing between the charge transfer layers, the method comprising oxidizing a surface of a substrate to form a semiconductor acicular crystal layer comprising aggregate of acicular crystals on the substrate and utilizing the semiconductor acicular crystal layer as either one of the charge transfer layers.

17. The method of producing a photoelectric conversion device according to claim 16, comprising the steps of providing an aluminium layer on a surface of the substrate, anodizing the aluminium layer to form a finely porous alumina layer, and oxidizing at least a part of the substrate to grow the semiconductor acicular crystals through the alumina fine pores.

18. The method of producing a photoelectric conversion device according to claim 16, wherein a substrate comprising any one of titanium, zinc, and tin at least in the surface is used as the substrate.

19. The method of producing a photoelectric conversion device according to claim 13 or 16, wherein a substrate having an electrode on the surface thereof is used as the substrate.

20. A photoelectric conversion device comprising

at least an electron acceptive charge transfer layer, an electron donative charge transfer layer, and a light absorption layer existing between the charge transfer layers, wherein either one of the charge transfer layers is a semiconductor layer comprising a mixture with two or more kinds of different morphologies or compositions and at least one of the kinds of the semiconductor layer is an acicular crystal.

21. The photoelectric conversion device according to claim 20, wherein the diameter of the acicular crystal is 1 μm or less.

22. The photoelectric conversion device according to claim 20, wherein the aspect ratio is 5 or more when the aspect ratio is defined as the ratio of the length to the diameter of the acicular crystal or as the ratio of the length of the acicular crystal to the length of a shortest line in a transverse cross-section passing the gravity center of the acicular crystal.

23. The photoelectric conversion device according to claim 20, wherein an aspect ratio is 10 or more when the aspect ratio is defined as the ratio of the length to the diameter of the acicular crystal or as the ratio of the length of the acicular crystal to the length of a shortest line in a transverse cross-section passing

the gravity center of the acicular crystal.

24. The photoelectric conversion device according to claim 20, wherein one end of the acicular crystal is bonded to an electrode provided on a substrate and the angle formed between the axial direction of the acicular crystal and the principal plane of the substrate is 60° or more.

25. The photoelectric conversion device according to claim 20, wherein the semiconductor other than the acicular crystal in the mixture is a fine particle with a diameter of 100 nm diameter or less.

26. The photoelectric conversion device according to claim 25, wherein the fine particle exists on a surface of the acicular crystal.

27. The photoelectric conversion device according to claim 20, wherein the material of the light absorption layer is dye.

28. The photoelectric conversion device according to claim 20, wherein the mixture comprises a metal oxide.

29. The photoelectric conversion device according

to claim 28, wherein at least one kind of the mixture is titanium oxide.

30. The photoelectric conversion device according to claim 28, wherein at least one kind of the mixture is zinc oxide.

31. The photoelectric conversion device according to claim 28, wherein at least one material of the mixture is tin oxide.

32. The photoelectric conversion device according to claim 20, wherein a part of the acicular crystal exists in a fine pore of a finely porous layer having a number of fine pores.

33. A method of producing a photoelectric conversion device which comprises at least an electron acceptive charge transfer layer, an electron donative charge transfer layer, and a light absorption layer existing between the charge transfer layers, the method comprising applying a semiconductor mixture solution comprising a semiconductor mixture with two or more kinds of different morphologies or compositions on a substrate and firing the substrate to form a semiconductor mixed crystal layer on the substrate, and utilizing the semiconductor mixed crystal layer as

either one of the charge transfer layers.

34. A method of producing a photoelectric conversion device which comprises at least an electron acceptive charge transfer layer, an electron donative charge transfer layer, and a light absorption layer existing between the charge transfer layers, the method comprising the steps of applying a solution containing a semiconductor acicular crystal on a substrate and firing the substrate to form an acicular semiconductor crystal layer, further depositing a single substance or a mixture with a different morphology or composition from that of the acicular crystal to the semiconductor layer to form a semiconductor mixed crystal layer on the substrate, and utilizing the semiconductor mixed crystal layer as either one of the charge transfer layers.

35. A method of producing a photoelectric conversion device which comprises at least an electron acceptive charge transfer layer, an electron donative charge transfer layer, and a light absorption layer existing between the charge transfer layers, the method comprising the steps of growing an acicular crystal on a substrate, depositing to the acicular crystal a single substance or a mixture with a different morphology or composition from that of the acicular

crystal to form a semiconductor mixed crystal layer on the substrate, and utilizing the semiconductor mixed crystal layer as either one of the charge transfer layers.

36. The method of producing a photoelectric conversion device according to claim 35, comprising the step of growing the acicular crystal on the substrate by a CVD process.

37. The method of producing a photoelectric conversion device according to claim 36, comprising the steps of forming an aluminium layer on a surface of the substrate, anodizing the aluminium layer to form a finely porous alumina layer, and growing a semiconductor acicular crystal through the fine pores of the finely porous alumina layer by a CVD process.

38. The method of producing a photoelectric conversion device according to claim 35, comprising the step of oxidizing a surface of the substrate to grow the acicular crystal on the substrate.

39. The method of producing a photoelectric conversion device according to claim 38, comprising the steps of forming an aluminium layer on the surface of the substrate, anodizing the aluminium layer to form a

finely porous alumina layer, and oxidizing at least a part of the substrate to grow a semiconductor acicular crystal through the fine pores of the finely porous alumina layer.

40. The method of producing a photoelectric conversion device according to any one of claims 35 to 39, wherein a substrate comprising any one of titanium, zinc, and tin in at least a surface thereof is used as the substrate.

41. The method of producing a photoelectric conversion device according to any one of claims 33 to 35, wherein a substrate having an electrode on a surface thereof is used as the substrate.